University completes vital environmental research up to 40 per cent faster with Dell HPC solution

- **Green efficiency**
- **HPC**
- **Server consolidation**
- **Systems management**

"Energy consumption is important to us, especially considering the type of research we conduct. It's great that this blade-based HPC cluster uses 25 per cent less energy compared with our previous solution."

Dr. Sofía Calero,
RASPA Group Leader,
Pablo de Olavide University

Customer profile

Company:	Pablo de Olavide University
Industry:	Education
Country:	Spain
Employees:	1,000
Website:	www.upo.es

Business need
Pablo de Olavide University needed an in-house high performance computing (HPC) cluster to complete environmental research faster and support 400 simulations a week.

Solution
With a HPC cluster based on Dell™ PowerEdge™ blade servers, the university has a green, flexible and powerful solution that will adapt to changing research needs.

Benefits
- **Simulations completed up to 40 per cent faster**
- **Computing capacity increased by around 30 per cent**
- **Length of simulations increased from four days to a month**
- **Energy consumption cut by around 25 per cent**
- **Flexible solution can react to changing research needs**

Despite being established just 13 years ago, the Pablo de Olavide University of Seville has become one of the world's most respected research institutions. It has developed a reputation for having expertise in the field of environmental research, and today performs vital studies into the effects of human activities on the environment.

In 2007, the RASPA Group - Group of Nanostructure Materials for Technological Applications, part of the department of Physical, Chemical, and Natural Systems - was awarded a grant by the Council of Andalucía to aid its studies into new materials that capture carbon dioxide. Dr. Sofía Calero is a professor at the university and group leader of RASPA. Together with her team, she manages a study to capture carbon dioxide particles in energetic and industrial processes.

This research is hugely important. Dr. Calero and the team are experts in the molecular simulation of nanoparticles, and study the adsorption and transport of greenhouse gasses in metal organic frameworks. The research they conduct contributes to our understanding of the "greenhouse effect" and climate change around the world.

With the grant from the Council of Andalucía, Dr. Calero wanted to build a high performance computing (HPC) cluster, saving time and money on molecular modelling. These sorts of simulations are memory intensive and require a powerful HPC cluster – especially when the group runs up to 400 simulations a week. There was a mixture of 50 servers and some small clusters, but they lacked power and every three to four days they had to stop simulations and store all the data that had been created before starting the experiment again. This led to the university using external supercomputer centres in Holland, Barcelona and Galicia to complete its

research. Dr. Calero says: "We needed a more powerful on-site solution to help us with this vital environmental research. With our old environment, we couldn't perform simulations for longer than four days before needing to stop and store data. Plus, sometimes it's not possible to use external supercomputer centres, so that also slowed us down."

Turnkey HPC solution deployed

Pablo de Olavide University turned to Dell and Catón – a Dell Certified Partner – for help. Catón went through a thorough consultancy phase with the group to design a solution that would best fit its needs, before settling on a HPC cluster. With only a small IT team, Dr. Calero needed a simple solution that was powerful, reliable and easy to maintain. The university deployed

Technology at work

Services

Dell ProSupport
 – Next Business Day On-site Service

Hardware

Dell™ PowerEdge™ M600 blade servers with Intel® Xeon® processors E5420

Dell PowerEdge 2950 servers with Intel Xeon processors E5420

Dell PowerEdge M1000e modular blade enclosures

40% faster simulations

Before / After

48 clustered Dell™ PowerEdge™ M600 blade servers with Intel® Xeon® processors E5420. Two PowerEdge 2950 servers act as management nodes, and the blades are housed in three Dell PowerEdge M1000e modular blade enclosures. The HPC is protected by Dell ProSupport with Next Business Day On-site Service. Catón deployed and configured the solution in just a few weeks. Dr. Calero says: "We were looking for a turnkey solution and that's what Dell delivered. Dell and Catón worked with us to ensure that the HPC cluster ticked all the boxes."

Environmental research completed around 40 per cent faster

The impact of the HPC cluster on the group's work was immediately apparent, and now projects are completed significantly faster than with the previous system. There's no need to re-launch simulations every three to four days to save and store data. Not only did this prolong the time needed to complete simulations, but key members of the team were taken away from their primary roles to manage the data storage and archiving process. This HPC cluster delivers 30 per cent more computing capacity than the previous in-house solution, completing simulations much faster. The new architecture is a good fit for the group's work. Dr. Calero says: "For a group such as ours, the details of the technology are far less important than the results. With this cluster, we can finish projects around 40 per cent faster. This is a great result for us and hopefully for society too."

University cuts energy consumption by around 25 per cent

In a group focused on environmental research, a green IT infrastructure is essential. One of the first things Dr. Calero noticed about the new HPC cluster was how little energy it consumed compared to the previous solution and other products on the market. Compared to the equivalent HP/IBM servers, the Dell blades and the PowerEdge M1000e enclosures produce much less carbon dioxide – equivalent to that produced by four acres of pine forest each year[1]. The Dell PowerEdge blades and M1000e modular blade enclosures are built with Energy Smart technology with features such as efficient power supplies, dynamic fans and optimised airflow to cool the chassis. This has made its mark at the Pablo de Olavide University. Dr. Calero says: "Energy consumption is important to us, especially considering the type of research we conduct. It's great that this blade-based HPC cluster uses 25 per cent less energy compared with our previous solution."

Flexible solution means no downtime

This type of HPC is ideal for the RASPA Group because it's flexible and can respond to changing processing needs. The simple standardised environment is a welcome change from the previous IT environment. Working with the same types of servers, Dr. Calero's team can simply swap another identical blade server in if there's a failure. And because the HPC is clustered, if one node fails, there's no

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[1] CO_2 claim based on kWh savings using Environmental Protection Agency data available here: http://www.epa.gov/cleanenergy/energy-resources/calculator.html

downtime – the HPC cluster continues to perform with no disruption. The group's research using the molecular simulation of nanoparticles is changing all the time, as are the processing demands placed on the HPC cluster. If, in future, a new project requires a greater performance than is currently available, Dr. Calero can quickly add this capacity to the system. Dr. Calero says: "This is a highly flexible HPC cluster, which we can scale according to our requirements. If we need to change the system, this has to be a simple process, and with a standardised, heterogeneous, clustered environment, we know that wherever the research takes us, we'll be able to follow."

Reliance on outsourced centres eliminated with month-long simulations

While the university still uses external supercomputing centres for short projects – usually no more than three days – it isn't reliant on external organisations for major simulations. Because the group is less dependent on supercomputer centres, it can control its research much more closely and make changes quickly when necessary. Dr. Calero says: "It's so much better to keep our research in-house, and this powerful HPC cluster makes that possible. Now we can run simulations for a month if we need to – an increase of around 700 per cent on what was previously possible. I'm excited about the possibilities for environmental research in the group."

For more information go to: dell.com/casestudies/emea and dell.es

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